

# Northeast Coastal and Barrier Network

National Park Service  
U.S. Department of the Interior

Northeast Coastal and Barrier Network



## Barrier Islands

### Shifting sands provide protection and habitat



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Fire Island is a *barrier island*, a long deposit of sand running parallel to the coast. By providing a buffer from the strong wind and waves that accompany storms, this barrier island protects the places we live in and love both on and off the island, including the seventeen communities within the park, the southern coast of Long Island, and the salt marshes and tidal flats of Great South Bay.

## Rising and Falling Dunes

Barrier dunes grow high and steep as dune grasses trap blowing sand. During large storms, waves and wind flatten the dunes into formations called overwash fans.

Overwash fans make the island temporarily wider and provide fertile ground for new salt marshes on the shore side of the barrier. Over time, the island narrows as wind rebuilds dunes higher and steeper, until the next storm forms new overwash fans. Dunes rise and fall like this again and again.

Because wind and waves regularly move the sand of barrier dunes, all barrier islands are constantly rolling over themselves, traveling closer and closer to the inland shore.



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This photo, taken just after Hurricane Sandy, shows Fire Island's dunes blown back onto the inner barrier in overwash fans.



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Acquisition, Coordination, Compilation, Data Management and Change Analysis of LiDAR and Other Geospatial Data Collected Pre- and Post-Hurricane Sandy  
Task Agreement P13AC00875 of Cooperative Agreement Number P09AC00212



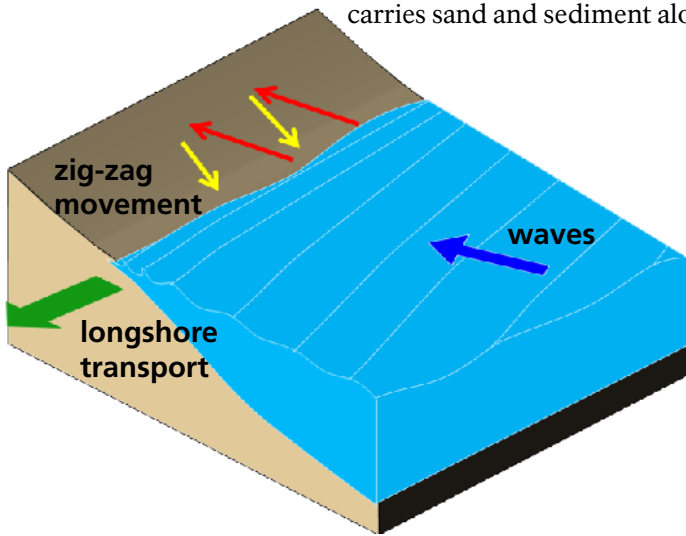


Sand and sediment accumulate at the western tip of Fire Island because of a process called longshore transport. In 1858, the Fire Island Lighthouse was built directly on the island's western inlet. Since then, longshore transport has caused sediment to build up to the point that the lighthouse is now situated five miles inland.

## A Conveyor Belt of Sand and Sediment

While Fire Island provides steady protection, the island itself is anything but steady. Fire Island—like all barrier islands—is in a constant state of flux. Through a process called longshore transport, a westbound current carries sand and sediment along the shore

and deposits it on the western side of the island, pushing the island further west. Built directly on the inlet in 1865, the Fire Island Lighthouse illustrates this shift. Over the course of 150 years, the inlet has shifted west, leaving the lighthouse miles behind.



Waves push sand and sediment up the shore at an angle and then back down again at a perpendicular angle. This motion causes sand and sediment to gradually travel along the shoreline in a process called longshore transport.



Hurricane Sandy created this breach in a federally protected wilderness on Fire Island. By December 2014, it was some 300 meters across at its narrowest point.

## A Breach or an Inlet?

A storm sometimes creates a break in the barrier, known as a breach. Breaches, where water flows directly from the ocean into the bay, are often temporary and close as a result of longshore transport or other dynamic shoreline processes. Hurricane Sandy

caused several breaches on Fire Island. NPS is monitoring one breach in a federally protected wilderness that, as of June 2015, remains open. Temporary breaches are distinct from permanent inlets reinforced by engineered structures and maintained through dredging.

## The Importance of Storms

As devastating as storms can be to infrastructure, they play an important role in the life cycle of a barrier island. Overwash fans create new habitat by adding elevation in back-dune marsh areas. Sand and sediment carried by storms create tidal deltas in areas like Great South Bay that will, in time, become new salt marshes. Breaches provide important habitat

for seals and saltwater fish, like summer flounder, bluefish, and striped bass, while improving water quality in the bay by flushing out nutrients. The changes caused by storms alter the way we use and navigate the park, but they are essential to Fire Island's continuing role as the guardian of Long Island's south shore.



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